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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,474	11/21/2001	Yuji Judai	MTS-2700US1	3161

7590

07/15/2004

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EXAMINER

WEISS, HOWARD

ART UNIT PAPER NUMBER

2814

DATE MAILED: 07/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/990,474

Applicant(s)

JUDAI, YUJI

Examiner

Howard Weiss

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5, 11, 12, 14 and 16-21 ~~is/are~~ pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5, 11, 12, 14 and 16-21 ~~is/are~~ rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Attorney's Docket Number: MTS-2700US1

Filing Date: 10/22/98

Continuing Data: Division of 09/177,038 (10/22/98, now abandoned);

RCE established 12/11/03

Claimed Foreign Priority Date: 10/24/97 (JPX)

Applicant(s): Judai

Examiner: Howard Weiss

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 11, 12 and 16 to 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arita et al. (U.S. Patent No. 5,624,864) and Shankar et al. (U.S. Patent No. 4,782,380).

Arita et al. show most aspects of the instant invention (e.g. Figure 20) including:

- providing a circuit board **31** and forming a first insulating film **37** at least indirectly on said circuit board
- forming a ferroelectric capacitor **41** by forming a lower electrode **38**, a ferroelectric film **39** and an upper electrode **40** on said first insulating film
- forming a second insulating film **46** and forming a plurality of contact openings **43b**, **43c** to said upper and lower electrodes
- forming a metal wiring pattern in said openings including a base layer **54b**, **54c** of TiN and an upper layer **44b**, **44c** of Al
- forming a surface protective film **55** of SiN over said second insulating film and metal wiring pattern

Arita et al. do not show heating-treating the TiN layer before directly depositing the upper Al layer after the heat treatment and depositing directly the Al layer on said TiN layer using sputtering and heating the circuit board in a temperature range of 100 to 400° C. Shankar et al. teach (e.g. Figure 1 and Column 4 Line 38 to Column 5 Line 23) to heating-treat (i.e. anneal) the TiN layer **40** before directly depositing the Al upper layer **50** using sputtering and heating the circuit board in a temperature range of 100 to 400° C to improve step coverage. (Column 2 Lines 48 to 53). It would have been obvious to a person of ordinary skill in the art at the time of invention to heating-treat (i.e. anneal) the TiN layer before directly depositing the Al upper layer using sputtering and heating the circuit board in a temperature range of 100 to 400° C as taught by Shankar et al. in the process of Arita et al. to improve step coverage.

3. Claims 5, 11, 12 and 16 to 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. (U.S. Patent No. 5,374,578) and Shankar et al.

Patel et al. show most aspects of the instant invention (e.g. Figures 1 to 11) including:

- providing a circuit board **1** and forming a first insulating film **10** at least indirectly on said circuit board
- forming a ferroelectric capacitor by forming a lower electrode **12**, a ferroelectric film **14** and an upper electrode **16** on said first insulating film
- forming a second insulating film **18** using TEOS-CVD method utilizing TEOS activated by O₃ (Column 5 Lines 19 to 32)
- forming a plurality of contact openings **20**, **22** to said upper and lower electrodes
- forming a metal wiring pattern **26** in said openings including a base layer of TiN and an upper layer of Al (Column 5 Lines 47 to 58)
- heat treating the TiN layer in the temperature range between 200 to 650° C (Column 5 Lines 64 to 68).
- forming a surface protective film **28** over said second insulating film and metal wiring pattern

Patel et al. do not show heating-treating the TiN layer before directly depositing the upper Al layer after the heat treatment using sputtering and heating the circuit board in a temperature rang of 100 to 400° C. Shankar et al. teach (e.g. Figure 1 and Column 4 Line 38 to Column 5 Line 23) to heating-treat (i.e. anneal) the TiN layer **40** before directly depositing the Al upper layer **50** using sputtering and heating the circuit board in a temperature rang of 100 to 400° C to improve step coverage. (Column 2 Lines 48 to 53). It would have been obvious to a person of ordinary skill in the art at the time of invention to heating-treat (i.e. anneal) the TiN layer before directly depositing the Al upper layer using sputtering and heating the circuit board in a temperature rang of 100 to 400° C as taught by Shankar et al. in the process of Patel et al. to improve step coverage.

4. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arita et al. and Shankar et al., as applied to Claim 16 above, and in further view of Wolf et al. (1986).

Arita et al. and Shankar et al. show most aspects of the instant invention (Paragraph 2) except for depositing the SiN layer using PECVD at RF power 300 W or less. Wolf et al. teach to deposit the SiN layer using PECVD so as to use low temperatures (Middle paragraph of page 192). It would have been obvious to a person of ordinary skill in the art at the time of invention to deposit the SiN layer using PECVD as taught by Wolf et al. in the process of Arita et al. and Shankar et al. so as to use low temperatures.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use RF power of 300 W or less, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. and Shankar et al., as applied to Claim 16 above, and in further view of Wolf et al.

Patel et al. and Shankar et al. show most aspects of the instant invention (Paragraph 3) except for depositing the SiN layer using PECVD at RF power 300 W or less. Wolf et al. teach to deposit the SiN layer using PECVD so as to use low temperatures (Middle paragraph of page 192). It would have been obvious to a person of ordinary skill in the art at the time of invention to deposit the SiN layer using PECVD as taught by Wolf et al. in the process of Patel et al. and Shankar et al. so as to use low temperatures.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use RF power of 300 W or less, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Response to Arguments

6. Applicant's arguments with respect to Claims 5, 11, 12, 14 and 16 to 21 have been considered but are moot in view of the new ground(s) of rejection. In reference to the claim language pertaining to heat-treating of the TiN layer to create tensile stress, the claiming of a new use, new function, or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and *In re Swinehart*, 439 F. 2d 210, 169 USPQ 226 (CCPA 1971); please see MPEP § 2112. Since the Prior Art show all the features of the claimed invention, the characteristic increase in tensile stress in the TiN layer is an inherent property of the invention of the combined Prior Art.

Conclusion

7. Paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit

Art Unit: 2814

2814 Fax Center number is **(703) 872-9306**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

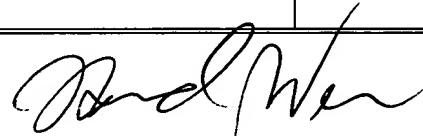
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 Receptionist at **(703) 308-0956**.

11. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 438/ 3, 240	thru 7/13/04
Other Documentation: none	
Electronic Database(s): EAST	thru 7/13/04

HW/hw
13 July 2004



Howard Weiss
Examiner
Art Unit 2814